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A REVIEW OF THE NORTH AMERICAN SPECIES OF GONIA sens. lat. (DIPTERA, TACHINIDAE) *

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The present summary of *Gonia* sens. lat. is made necessary because of a large number of undescribed species recently segregated in the Canadian National Collection and by Dr. H. J. Reinhard. The group covered is the same as that summarized by Tothill (1924) and Morrison (1940), the latter work containing all records of species up until 1940 and with illustrations of the male genitalia of each species. It becomes only necessary then to present descriptions of new species and to fit all species into their proper restricted genera (in Townsend's sense): a key to all described North American species and illustrations of the new species are included.

The species determined at present as *Gonia* spp. are generally closely allied; however, certain smaller groups may be separated from the main body, and these form natural restricted genera. For the main part the head appears to possess the best characters to delimit these groups, with the appearance of the male genitalia a strong supporting character. To group the species on the genitalia alone, however, gives an erroneous impression of relationship; for example, the species of Morrison's first or "*frontosa* group", placed together because of the similarity of the male genitalia, fall (when other characters are considered) into three different groups or restricted genera, *Knabia* TT., *Rhedia* RD., and a new genus (*fuscicollis* Tll.) of nearly equal rank; similarly other species groups outlined by Morrison contain species that are outside *Gonia* in a restricted sense.

I am greatly indebted to R. W. Smith of the Belleville Laboratory who turned over to me a partly completed work on *Gonia* including many specimens and drawings, to Dr. H. J. Reinhard for loan of his material and to Dr. F. O. Morrison of Macdonald College for his painstaking work on checking specimens and manuscript. Without the help of these gentlemen the summary would have been very difficult.

KEY TO THE GENERA OF GONIA sens. lat.

1. First vein setose on the central portion, front very prominent ..... *Setigonia* n. gen.
   First vein bare 2
2. Head at least five-sixths as long as high, parafacials abnormally wide 3
   Head at most three-fourths as long as high, parafacials not abnormally wide 4
3. Front very prominent, parafacials with a strong inner row of bristles and very numerous weaker rows; haustellum short; species mostly black, thoracic hairs black ..... *Cystogonia* TT.
   Front not particularly prominent, the whole head swollen; parafacials with five to eight scattered rows of bristles besides the stronger inner row; haustellum long; species mostly red with yellow thoracic hair (female only) ..... *Gonia pilosa* n. sp.
4. Parafacials set with scattered bristles, no rows being stronger or well differentiated; proboscis very long; epistoma projecting beyond the facialia; front not prominent; third vein bristled only at the base ..... *Onychogonia* BB.

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Parafacials with a strong inner row of bristles next the facialia; third vein bristled at least nearly half way to the crossvein 5

5. Abdomen narrower than the thorax, long and pointed, no marginals on the first abdominal segment ..... *Phosocephalops* TT.
Abdomen at least as wide as the thorax, not long and pointed 6

6. Parafacials abnormally narrow, about clypeal width above, narrowed below, head not swollen; claws and pulvilli long in the male; first abdominal segment of female generally without marginals ..... *Cnephalogonia* TT.
Parafacials at least over clypeal width, head more or less swollen in appearance 7

7. Bristles of head and thorax fine, hair-like, particularly in the male; front and face convex when viewed in profile, the parafacials somewhat bulging; claws and pulvilli short; haustellum not half head height ..... *Knabia* TT.
The bristles of the head normal, *or* the front and face flat, *or* the haustellum elongate 8

8. Haustellum elongate, about half head height in length; whole head with an inflated appearance; large, robust species, 10-15 mm. long ..... *Gonia* M.
Haustellum short; small, slender species, 8-11 mm. long 9

9. Parafacials over twice as wide as clypeus above, uniformly set with six to eight rows of setae; front prominent; eye small; front and face of about equal length, front slightly convex; female head nearly hemispherical (fig. 2) ..... *Rhedia* RD.
Parafacials just over clypeal width above, set with two or three scattered rows of setae; front not prominent; eye larger; face longer than front, front flat; head triangular (fig. 1) ..... *Fuscigonia* n. gen.

Genus **Cystogonia** Townsend

1915, Pr. Biol. Soc. Wash., XXVIII, 21, one species as *Gonia turgida* Cq. (Rev. Tach., 134, 1897); Manual of Myiology, XI, 19, 1941, one species.

Front very prominent, the antennal axis at least five-sixths as long as the head height, parafacials strongly narrowed below, densely fine haired in 12 to 15 rows, rows denser next the eye; front convex; proboscis short, haustellum about as long as cheek height, cheek half to three-fifths eye height; antennae long, third segment about five times the length of the second in the male; thoracic setae fine. Abdomen largely reddish at the sides, broad central line shining or subshining black, lateral margins heavily white pollinose giving the abdomen a trilined appearance. Forceps short and broad, ventral edge straight, tips evenly rounded.

I accept as *turgida* Cq. one male specimen, Idaho, May 2, in the Canadian National Collection, with the above description. Only part of Morrison's *turgida* belongs here, the remaining specimens falling in *aturgida* n. sp., a true *Gonia* on longer proboscis, less prominent front, strong thoracic setae and normal abdomen color. It seems probable that the *turgida* of Tothill (1924) was also *aturgida*. The holotype of *Gonia turgida* Cq. is from Los Angeles, California.

Genus **Phosocecephalops** Townsend

1926, Gen. Musc. Hum. Trop. Am., 237, one species as *P. fulvus* TT. which equals *Gonia pallens* Wiedemann; Manual of Myiology, XI, 42, 1941, seven South American species included.

In our fauna *Gonia texensis* Reinhard (Ent. News, XXXV, 357, 1934) stands apart on the wide head, slender thorax, slender long-pointed abdomen, lack of marginal bristles on the first abdominal segment and very deep broad male forceps.* The species appears to be an extension of the South American fauna rather than the North American although related to *Gonia porca* Will., both having a somewhat similar head shape, parafacials well narrowed below and comparatively narrow, etc. The parafacials are not convex as in *porca* but flattened and somewhat narrower with the same general shape as in *Cnephalogonia*

*Since the above was written I have seen representatives of *Gonia pallens* Wd. from Chile. Although the abdomen is broader than in *texensis* the two species are clearly congeneric.

distincta (Smith) to which *texensis* is clearly related. I have seen specimens only from Texas.

Genus **Cnephalogonia** Townsend

1916, Ent. News, XXVII, 178; Pr. U. S. Nat. Mus., LI, 306, one species as *Gonia distincta* Smith; Manual of Myiology, XI, 18, 1941, two species included.

Gonia distincta Smith (Psyche, XXII, 99, 1915) is related to *Phosococephalops texensis* (Rnh.) in our fauna and like that species appears to have originated from some South American source.

Head little swollen; parafacials narrow, and narrowed below to just over half the width of the facial depression; haustellum long; claws and pulvilli elongate in the male; abdomen as broad as the thorax, marginals present on the first abdominal segment of the male, usually absent in the female.

In Canada the species ranges as far west as Alberta.

Genus **Reaumuria** Robineau-Desvoidy

1830, Myodaires, 79, six species including *Musca capitata* RD. *nec* DeG. which equals *Gonia ornata* Meigen, designated as type of *Reaumuria* by Desvoidy (1863); Townsend, Manual of Myiology, XI, 46, 1941.

This genus is doubtfully present in North America. *Gonia pilosa* n. sp. herein described in the *capitata* group of *Gonia* may belong on the greatly enlarged head, but as only one female of *pilosa* is known the generic reference is doubtful.* Other detail will be found under the description of *pilosa*.

Genus **Setigonia** n. gen.

Genotype—Gonia setigera Tothill, Can. Ent., LVI, 197, 1924.

This genus is readily separated from other genera with a very prominent front and long head included in *Gonia* sens. lat. by the presence of bristles on the first vein. The genus runs to *Reaumuria* RD. in Townsend's key.

Length 8-12 mm. Black with yellowish head and largely red abdomen. Head eight-ninths as long as high, the front very prominent; front and face flat, about equal length, both well sloped; clypeus elongate, deeply set, edges nearly parallel, epistoma warped at sixty degrees but not projecting beyond the facialia; proboscis medium length, one-third head height; front and face broad, vertex half to two-thirds head height, front and face not widened, frontalia narrow; parafrontals bearing two rows of bristles outside the frontal row; parafacials nearly twice clypeal width, narrowed below, set with a stronger inner row of bristles and three to five finer rows; eye oval; cheek two-fifth eye height; third antennal segment three times the second in the male, one and a half times the second in the female, second aristal segment longer than the third.

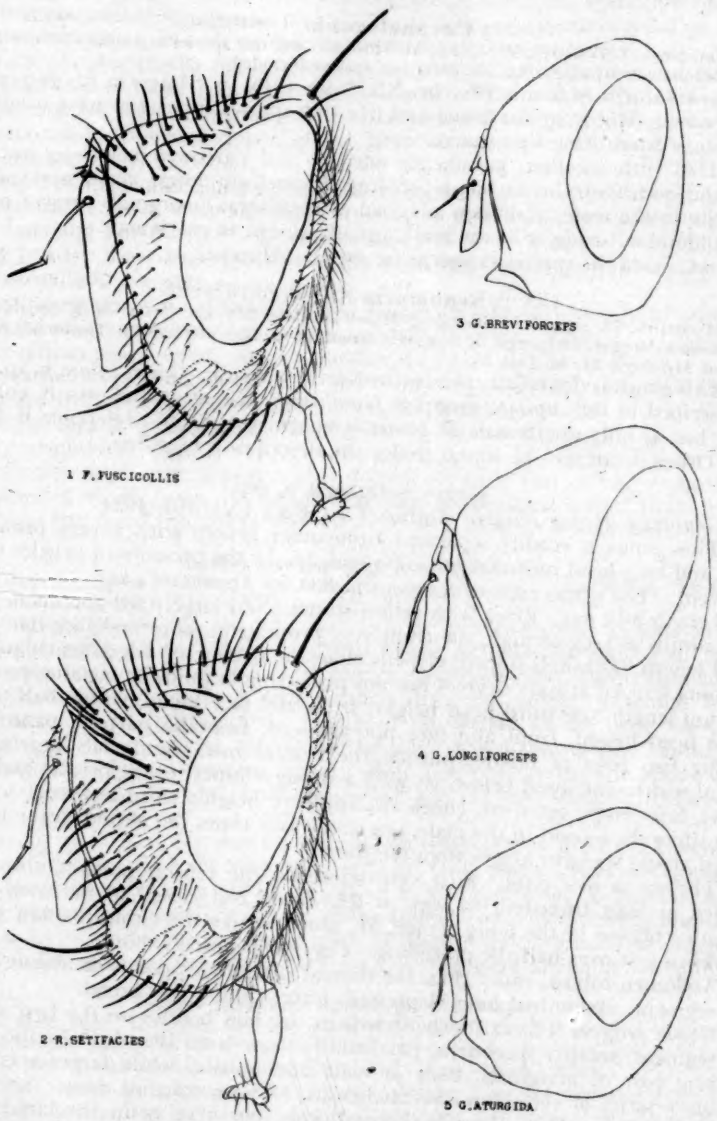
Thorax as in *Gonia*. First vein setose on the central portion, third vein bristled at least three-fourths way to R^6, apical cell closed to narrowly open, cubitulus obtuse in the wing centre, M_3 much nearer the cubitulus, last section of cubitus just over half the preceding. Claws and pulvilli short.

Abdomen robust, wider than the thorax; marginals present or absent on the first segment; abdominal hairs depressed; forceps short and broad.

Gonia setigera Tll. varies in regards to size and bristles on the first abdominal segment; smaller specimens, particularly those from British Columbia, show a strong pair of marginals, both in male and female, while larger specimens, notably a series of eight from Saskatchewan, have no trace of these. Specimens from Point Pelee, Ont., show both conditions, but here again the larger specimens are without marginals. The male forceps of the two groups is the same and the presence or absence of these bristles appears to be a population character rather than a specific one.

*Since writing the above I have obtained specimens of *Gonia ornata* Meigen (det. Bezzi) and find that *ornata* is closely allied to our *Gonia breviforceps* Tll. The genus *Reaumuria* should be used for all species considered herein as belonging to the *aldrichi-breviforceps* group of *Gonia*. *Isomera* RD. was founded for another species of the same group. *Gonia pilosa* n. sp. does not belong; see footnote under *Gonia*

PLATE XVI.



SPECIES OF *GONIA* scns. lat.

Fig. 1. Fuscigonia fuscicollis (Tll.), male head.
2. Rhedia setifacies n. sp.; male head.
3. Gonia breviforceps Tll., female head.
4. Gonia longiforceps Tll., female head.
5. Gonia aturgida n. sp., female head.

Genus **Knabia** Townsend

1915, Can. Ent., XLVII, 286, one species as *K. hirsuta* TT.; Manual of Myiology XI, 37, 1941, one species.

The description of *K. hirsuta* TT. (Oxbow, Sask.) exactly fits specimens of *Gonia frontosa* Say (equals *G. philadelphica* Macquart, 1840, equals *G. albifrons* Walker, 1849; neotype of *frontosa* from Aweme, Man.) and I have been unable to separate the two. The species is rather variable and has often been misidentified as others, notably as *G. longiforceps* Tll.

Typically the head bristles and often the thoracic bristles are fine and hair-like, front and face slightly convex, haustellum about one-third head height, parafrontals only slightly narrowed below, face widened below, thorax and abdomen with erect hairs; claws and pulvilli short; length 8-10 mm.; head bright yellow, abdomen black with slightly reddish sides and narrow silvery bands. The female is very similar, but the bristles tend to be stronger, the face flatter and the haustellum longer; pulvilli very short; marginals present or absent on first abdominal segment. The females in particular vary over wide limits and in some cases cannot be distinguished from *G. grandipulvilli* Morrison except in series; the very short pulvilli seem to be the best character in such instances. *Gonia frontosa* ranges over most of the United States and Canada and is rather common.

Gonia sagax TT. (Can. Ent., XXIV, 65, 1895) also belongs to this genus, differing from *frontosa* chiefly in the reddish antennae and slightly longer forceps. Originally described from Iowa, the neotype is from New Jersey.

Genus **Fuscigonia** n. gen.

Genotype—Gonia fuscicollis Tothill, Can. Ent., LVI, 207, 1924.

Length 8-9 mm. Black with reddish scutellum and narrow silvery pollinose abdominal bands. Head about two-thirds as long as high, front not particularly prominent; face longer than the front, front and face flat; clypeus deep dished, particularly in the male, with nearly parallel sides; epistoma warped at sixty degrees, not projecting beyond the facialia; proboscis short, haustellum about cheek height, labellum small; vertex nearly three-fifths head width, front and face parallel-sided or nearly so; parafrontal set with two rows of bristles outside the frontal row, frontal bristles three below the antennae base; parafacials one-sixth wider than the clypeus above, narrowed to five-sixths clypeal width below, giving the head a strong triangular appearance, flat, set with two or three scattered rows of bristles besides the strong inner row; facialia bristled one-third way; eye long, oval; cheek over one-third eye height; third antennal segment four to five times the length of the second in the male, just over twice the second in the female, second aristal segment longer than the third.

Thorax as in *Gonia*. Third vein bristled half way to the crossvein, other veins bare; apical cell open, M_3 half its length from the cubitulus which is obtuse in the centre of the wing; last section of cubitus over half the length of the preceding section. Claws and pulvilli short.

Abdomen wider than the thorax, short; marginals present on the first segment or absent in the female. Male forceps short and very broad.

G fuscicollis Tll. shows a remarkable resemblance to the European species *R. sicula* RD. (equals *fasciata* M.), or at least to European specimens so determined in our collection. The two are congeneric in the narrowest sense. The dark brown occipital ruff is found only in *fuscicollis* of our *Gonia* sens. lat.

Besides a paratype male (LaFayette, Indiana), the Canadian National Collection contains two males and eight females from Aweme, Man., collected in April.

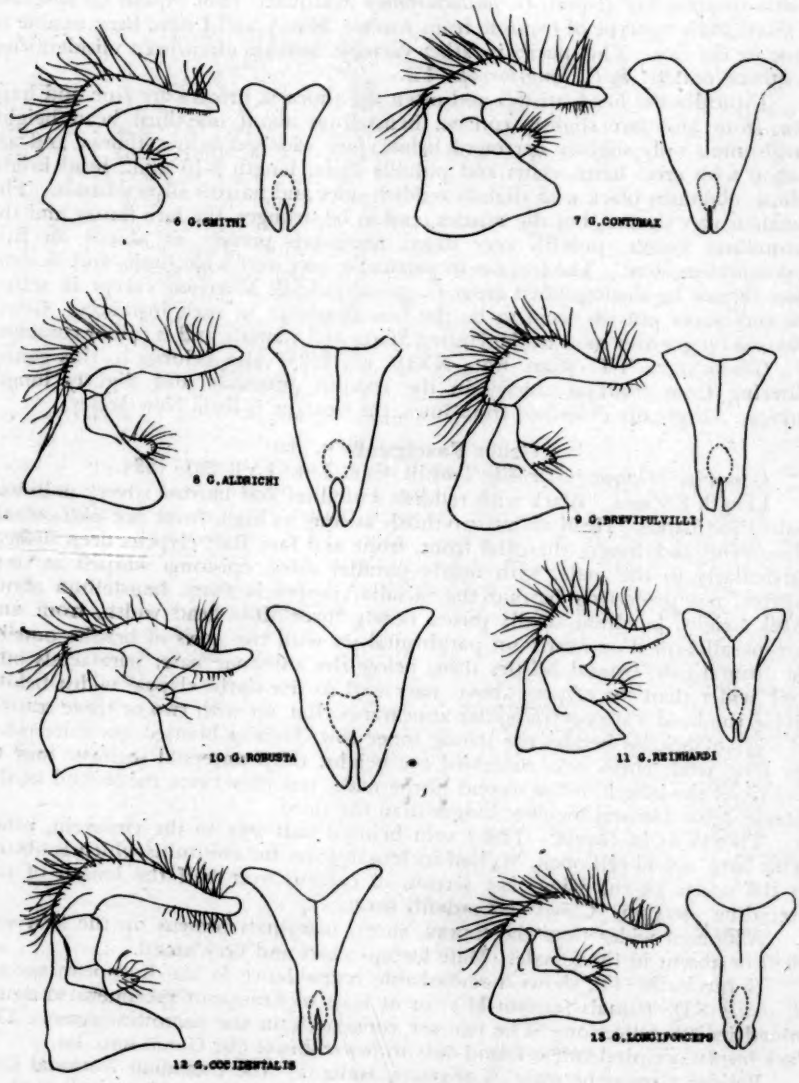
Genus **Rhedia** Robineau-Desvoidy

1820, Myodaires, 64, nine species, genotype *R. vicina* RD. which equals *Gonia atra* Meigen, so designated by Coquillett.

Pissemya R.-Desvoidy, Ann. Soc. Ent. Fr. (2), IX, 318, 1851, one species as *Gonia atra* Meigen.

This genus is related both to *Knabia* TT. and to *Fuscigonia* n. gen., but can

PLATE XVII.



SPECIES OF *GONIA* sens. lat.

be separated by the longer, nearly hemispherical head, heavily bristled, broad parafacials and short proboscis, etc. The species of *Rhedia, Knabia* and *Fuscigonia* are the smallest of our *Gonia* sens. lat.

Rhedia setifacies n. sp.

(fig. 2.)

Male and Female. Length 8-10 mm. Largely black, the abdomen with reddish sides. Head seven-ninths as long as high, the front very prominent in the male, somewhat less so in the female; front and face of equal length, flat to slightly convex; clypeus elongate, deeply dished, sides nearly parallel; epistoma warped at nearly ninety degrees but not projecting beyond the facial ridges; proboscis short, haustellum not as long as cheek height, labellum small; vertex over half head width, the front slightly widened anteriorly, face widened below; parafrontals set with two or three rows of bristles outside the frontal row; frontal bristles very widely divergent, three below the antennae base, the lowest one nearer the eye than facialia; parafacials twice clypeal width above, well narrowed below, bulging in the centre, set with a stronger inner row of bristles and four to seven dense weaker rows, the bristles fine above in the male; eye small and oval, cheek half eye height; third antennal segment four times the second in the male, two and a third times second in the female; second aristal segment half to two-thirds as long as the third. Thorax as in *Gonia;* third vein bristled halfway to the crossvein, cubitulus obtuse in the wing centre; M_3 sinuate, nearer to the cubitulus, last section of cubitus half or more the length of the preceding section. Claws and pulvilli short. Abdomen wider than the thorax, possessing marginals on the first segment, central marginal pair of third segment set well forward, discal row on fourth segment; hair of thorax and abdomen dense, long and erect.

Head subshining yellow, the yellowish pollen very thin, practically absent; antennae and arista black, the second antennal segment brownish; palpi yellow, occipital ruff yellow, cheek hairs and parafacial bristles black. Thorax and legs black; scutellum, prescutellar area and lateral line reddish; mesonotum thinly brown, pollinose vittae not evident in the male, more heavily pollinose with distinct vittae in the female. Wings clear, veins dark; squamae white. Abdomen black, broadly reddish at the sides of segments one, two and three, the silvery pollen confined to the anterior third of segments two and three, the anterior half of four. Forceps similar to *frontosa,* shallow, twice as long as the width across the base, ventral edge curved, tips turned up.

Holotype — ♂, Pike Lake, Sask., 28.IV.1940 (A. R. Brooks); No. 5450 in the Canadian National Collection, Ottawa.

Allotype — ♀, same data as type.

Paratypes—1 ♂, same data as type; 2 ♂, Aweme, Man., 6.V.1920 (P. N. Vroom); 1 ♀, Idaho, 1918 (E. H. Quayle); 1 ♀, Aweme, Man., 6.V.1920 (P. N. Vroom).

Rhedia nigra n. sp.

Female. In structure this species is very like *setifacies,* the head however is more rounded, apical cell nearly closed in the wing margin; parafacials well over twice clypeal width above; haustellum very short.

Head including frontalia heavily whitish pollinose, cheek pollinosity thinner, occipital ruff white; abdomen wholly black with narrow anterior edges of segments thin grey pollinose; abdominal hairs suberect.

I would also place in this species, besides the above specimen, one female having considerable red on the side of abdominal segment two, but with the same rotund pollinose head, and one female with a somewhat longer, flatter front but agreeing otherwise.

Male. One rather battered male in the Canadian National Collection which agrees with the female on largely black abdomen and nearly closed apical cell has a subshining yellowish head as in *setifacies;* the forceps have a straight ventral edge and the tips are not turned up.

Holotype — ♀, Swift Current, Sask., 15.V.1938 (A. R. Brooks); No. 5451 in the Canadian National Collection, Ottawa.

Allotype — ♂, Lillooet, B. C., 27.III.1941 (A. Phair).

Paratypes — 1 ♀, Cranbrook, B. C., 8.V.1922 (C. B. D. Garrett).

Genus **Onychogonia** Brauer and Bergenstamm

1889, Musc. Schiz., 1, 32, one species as *Gonia interrupta* Rondani; Townsend, Manual of Myiology, XI, 41, 1941, four species.

This genus is rather far removed from other *Gonia* sens. lat. and apparently has originated from some Spallanzania-like ancestor.

Head nearly rectangular or rhomboid in profile, front shorter than the face, well sloped, arcuate to flat; face flat, little sloped; epistoma projecting beyond the facialia; proboscis long, haustellum three-fifths to three-fourths head height; parafacials equibroad, about as wide as the facial depression throughout, bearing three or four scattered rows of hair-like bristles, no strong inner row; facialia broad, bristled one-third way; eye large, cheek three-sevenths eye height; antennae long, second aristal segment one-third the length of the third.

Thorax as in *Gonia;* three to five long lateral scutellars. Claws and pulvilli long. Third vein bristled at the base, M_3 half its length from the cubitulus, last section of cubitus just under one-third length of the preceding.

Abdomen with marginals on first and second segment, sometimes doubled or tripled, fourth segment with a discal row; abdominal hairs erect or depressed, often nearly as large as macrosetae and appearing like discals. Male genitalia large, forceps long and heavy, lobes of fifth sternite scalloped along the inner edge.

The four North American species may be separated in accordance with the following key.

1. Vertex in both sexes nearly half head width, the front and face evenly widened; third antennal segment of the male four or five times the length of the second, three times the second in the female; mesonotum heavily pollinose in both sexes; abdomen robust, wholly shining black, the hairs stout and depressed. (Utah, Wash.) ..... *magna* n. sp.

   Vertex just over one-third head width, the front equibroad, face widened; third antennal segment of the male three times the length of the second, slightly shorter in the female; mesonotum subshining in the male, heavily pollinose in the female; abdominal hairs fine, dense and erect at least in the male. 2

2. Forceps of male very shallow, not half as deep as wide, ventral edge curved ventrally at the apex; female abdomen very hairy (Labr., Alta., Alaska) ..... *tenuiforceps* (Morrison)

   Forceps of male not particularly shallow, more than half as deep as wide, ventral edge nearly straight; female abdomen not hairy 3

3. Second antennal segment black or dark brown; parafrontals white pollinose; abdomen shining or subshining black (B. C., Alta., Wyo.) ..... *fissiforceps* (Tothill)

   Second antennal segment reddish; parafrontals subshining yellow with thin yellowish pollen; abdomen with grey pollinose bands (Yukon, B. C., Alta., Colo., Lake Abitibi, Ont.) ..... *yukonensis* (Tothill)

   Second antennal segment brown; parafrontals subshining yellow; abdomen shining black (1 ♂, Mt. Rainier, Wn.) ..... *fissiforceps-yukonensis* intermediate

Gonia fissiforceps Tll. (Can. Ent., LVI, 207, 1924) and *Gonia yukonensis* Tll. (l. c., 210) are very closely allied and vary enough so that intermediate specimens occur; the genitalia differences outlined by Morrison are not evident when series are studied. The types of both species have densely haired parafacials but all

other specimens in the collection have comparatively little hair on the parafacials.

O. magna n. sp. is atypic of the group on the shape of the head, wider front, broader parafacials, longer antennae, depressed abdominal hair, etc., approaching true *Gonia* on these characters.

Onychogonia magna n. sp.

This robust species is one of our most easily recognized, appearing at first glance to be a species of *Archytas*.

Male. Length 13-15 mm. A robust species with whitish head, heavily pollinose mesonotum and shining black abdomen. Antennae and arista black, second antennal segment brownish, third segment four or five times as long as the second, second aristal segment one-third as long as the third. Front and face wholly white pollinose, frontalia and palpi yellow, the palpi darker on the basal half; vertex three-sevenths head width, front and face evenly widened to three-fifths head width; parafrontals set with two or three rows of bristles outside the frontal row, parafacials slightly narrowed below, one and one-third times as wide as the facial depression, set with unequal bristles in three scattered rows; facialia bristled one-third to one-half way; cheek over one-third eye height; occipital ruff yellowish.

Thorax black, scutellum and lateral line up to the suture reddish, mesonotum grey pollinose with four distinct vittae. Legs black, claws and pulvilli long. Wings clear, slightly yellowish at the base, veins yellow; third vein bristled only at the base; squamae white with yellowish edges.

Abdomen wholly shining black; one strong marginal pair on segments one and two, a marginal row on segment three, a discal row and weaker marginal row on four; abdominal hairs short, stout and depressed on intermediate segments. Forceps similar to *fissiforceps* (Morrison's fig. 18), fifth sternite scalloped.

Female. Third antennal segment three times the length of the second; head wholly yellow-white pollinose; parafrontal bristles in two or more rows; mesonotum heavily pollinose with distinct vittae; abdomen robust, wholly shining black; otherwise, except for sexual differences, as in the male.

Holotype — ♂, Allen Canyon, Utah, Aug. 21, 1942 (G. F. Knowlton and S. L. Vood); No. 5452 in the Canadian National Collection, Ottawa.

Allotype — ♀, same data as type.

Paratypes — 5 ♂, 9 ♀, same data as type; 4 ♀, Yakima, Wash., Aug. 29, 1931 (A. P. Rolfe); 1 ♀, Beaver, Utah, 16.9.38; 1 ♀, Laketown, Utah, 21.9.1938. (Knowlton and Harmston).

Genus **Gonia** Meigen*

1803, Illig. Mag., 11, 280, no species; 1826, Syst. Bes., V, 2, 13 species including *Musca capitata* De Geer designated as type of *Gonia* by Curtis (1835); Townsend, Manual of Myiology, XI, 33, 1941, four North American species.

Salmacia Meigen, Nouv. Class. Mouches, 38, 1800, no species; Coquillett (1910) referred *Musca capitata* DeG. to this genus as type species.

Isomera RD. Ann. Soc. Ent. Fr. (2), IX, 315, 1851, two species including *Reaumuria blondeli* RD. (1830) designated as type of *Isomera* by Coquillett (1910).

The genus *Gonia* as herein restricted contains two rather distinct elements, the *capitata* group and the *aldrichi-breviforceps* group. The *aldrichi-breviforceps* group appears to correspond to *Isomera* R.D., and it may be necessary in the future to reinstate this genus. In general *Gonia* may be separated from allied genera on the following combination of characters: Head inflated, not over three-

Salmacia Meigen was based originally on one species without name which was identified as *capitata* DeG. by Coquillett. The genus name is valid according to the rules of nomenclature and should replace *Gonia* M. Only the species herein included in the *capitata* group belong. *Isomera* RD. is a synonym of *Reaumuria* RD.; see footnote under *Reaumuria*.

fourths as long as high, bristles stout, proboscis elongate, third vein bristled about halfway to the cross-vein and abdomen wider than the thorax. The appearance of the male genitalia alone is not sufficient to separate the species or species groups; color, extent of hairiness and head shape characters can also be used to good advantage.

The writer proposes to recognize two main groups, the *capitata* group corresponding to Morrison's *sequax* group and the *aldrichi-breviforceps* group corresponding roughly to Morrison's *aldrichi* and *breviforceps* groups.

capitata group

There are six North American species belonging to this group, *senilis* Will., *porca* Will., *sequax* Will. (*exul* Will.) *longipulvilli* Tll., *pilosa* n. sp. and *reinhardi* n. sp. These are closely related to the European *capitata* (DeG.) on the following combination of characters: Parafacials decidedly narrowed below, about eye width at antennae base (♂), but two-thirds this width at the vibrissae; front convex and well sloped; parafacial somewhat bulging, the parafacial setae comparatively short and sparse; cheek one-third eye height, finely haired; abdomen robust with a tendency to be narrowed, largely red with a comparatively narrow black central vitta, abdominal hairs stout, short and depressed; forceps in general short and deep; late summer species.

Of the above species *senilis* and *porca*, particularly *porca*, shows evident relationship with *Phosococephalops texensis* (Rnh.) on the narrower parafacials, narrowed abdomen and deeper forceps. *G. pilosa* n. sp. doubtfully belongs on the shorter antennae and more inflated head.

aldrichi-breviforceps group

Parafacials generally broader than in the preceding group, the front more flattened and not so strongly sloped, parafacials generally flat, the parafacial setae comparatively dense; abdomen largely black with reddish sides, the hair finer and in most species long and erect; forceps not deep; spring and early summer species.

breviforceps subgroup — Four North American species belong here: *breviforceps* Tll., *albagenae* Morr., *contumax* n. sp. and *aturgida* n. sp., linked together by the structure of the male forceps, these being short and broad, at most very slightly turned up, tips evenly rounded; parafacials nearly equibroad, front flattened; abdomen broadly reddish at the sides. *Breviforceps* on the one hand shows evident relationship to *aldrichi* Tll. on the narrowed parafacials; *aturgida* n. sp. on the other links the genus to *Cystogonia turgida* Cq., and also has many characters in common with *G. occidentalis* n. sp. of the *aldrichi* subgroup.

aldrichi subgroup—This subgroup is more variable than the last, containing seven North American species: *aldrichi* Tll., *brevipulvilli* Tll., *longiforceps* Tll. (*discalis* Morr.), *grandipulvilli* Morr., *robusta* n. sp., *occidentalis* n. sp. and *smithi* n. sp. The species are linked together by the structure of the male forceps, which are longer and narrower than in *breviforceps*, with the ventral edge arcuate, the tips turned up and enlarged. Of the above species *grandipulvilli* appear to connect *aldrichi* with *Knabia frontosa* (Say), both possessing very similar females; *robusta* shows a departure in the very robust hairy body and broadened forceps, *longiforceps* and *smithi* by the narrowing of the forceps; *occidentalis* is atypic of the group on the straighter forceps, convex, equibroad, heavily haired parafacials, long setae and body hair, and approaches the *breviforceps* group through *aturgida*.

Key to the North American Species of *Gonia* M.

The females of *Gonia* have always presented difficulties because of their apparent lack of characters. Most species are quite similar to their respective

males; some, however, differ greatly. In the following key to females, "mesonotum subshining" or "mesonotum heavily pollinose", "front subshining" or "front white pollinose," are characters best seen directly from above and without additional light or magnification. When the mesonotum is subshining the pollinosity is thin and the vittae distinct only in front or not completed. The female genitalia on the whole do not possess sufficiently distinctive characters to be of use in determination and are practically the same throughout.

The male of *Gonia pilosa* n. sp., the female of *Gonia robusta* n.sp. and the female of *Gonia brevipulvilli* Tll. are not known.

Males

1. Cheek hairs yellow; abdominal hairs depressed; abdomen largely red with a mid-dorsal black stripe; claws and pulvilli short 2
   Cheek hairs largely black 5
2. Parafacials very wide, at least as wide as the eye, not narrowed below; front long and flat, cheeks two-fifth eye height, forceps short, the ventral edge straight ..... *albagenae* Morrison
   Parafacials decidedly narrower below; front slightly convex; cheek one-third eye height. 3
3. Antennae and arista orange-yellow; parafacials with bright golden pollen; forceps broadly shield-shaped ..... *senilis* Williston
   Antennae and arista mostly black 4
4. Pleura with yellow pile; fifth sternite yellow ..... *porca* Williston
   Pleura without yellow pile; fifth sternite black ..... *sequax* Williston (*exul* Will.)
5. Claws and pulvilli as long as the last tarsal segment 6
   Claws and pulvilli shorter than the last tarsal segment 7
6. Abdomen largely red, the last segment and a narrow dorsal line black; forceps large, straight on the ventral edge, the tips evenly rounded, dorsal convexity conspicuous and extending to the cleft; cheek hairs fine ..... *longipulvilli* Tothill
   Abdomen at most slightly reddish at the sides; forceps long, distinctly turned up at the tips, the tips somewhat dilated, dorsal convexity small; cheek hairs normally coarse ..... *grandipulvilli* Morrison
7. Abdomen mostly red, the dorsal stripe not wider than the distance between the marginal bristles; forceps small with a very strong dorsal hump, tips slightly turned up and evenly rounded (fig. 11) ..... *reinhardi* n. sp.
   The dark dorsal stripe at least wider than the distance between the marginal bristles; forceps not as above 8
8. Parafacials unusually wide, with numerous rows of black setae; forceps short triangular with straight dorsal and ventral edges, the tips evenly rounded. ..... *aturgida* n. sp.
   Parafacials of normal width with mostly scattered hairs in three to six rows 9
9. Forceps broad, more than half as wide across the base as long 10
   Forceps long and narrowed, at least twice as long as wide 12
10. Forceps as broad as long, strongly turned up at the tips; species very robust, abdomen as wide as long and covered with short, dense, erect hairs (fig. 10). ..... *robusta* n. sp.
    Forceps not as broad as long, ventral edge straight; species less robust, the abdomen narrower 11
11. Parafacials comparatively narrow, at most one-fifth wider than the facial depression (7:6), narrowed below; slender species 9-11 mm. long. ..... *breviforceps* Tothill
    Parafacials very wide, two-thirds wider than the facial depression (10:6), not narrowed below; robust species 12-14 mm. long (fig. 7) ..... *contumax* n. sp.

12. Tibiae reddish; face and parafacials somewhat convex; front and face subshining yellow; forceps with nearly parallel edges, tips evenly rounded, only slightly turned up (fig. 12) ..... *occidentalis* n. sp.
Tibiae black 13

13. Hair of abdomen stout, short and at most semi-erect, large species 14
Hair of abdomen long and fine, mostly erect, at least in the central region and on the fourth segment 15

14. Forceps broadly triangular, the enlarged basal portion small; front broad and flat, noticeably projecting at the antennae base, parafacials narrowed below, width of face at lower eye level equal to or less than the vertex width, the sides of the front and face nearly parallel (fig 8) ..... *aldrichi* Tothill
Forceps not broadly triangular, the enlarged basal portion about one-third the length of the forceps, the sides of the forceps practically parallel on the apical two-thirds; width of face at lower eye level noticeably wider than vertex, the sides of the front parallel but the the sides of the face strongly divergent (fig. 9) ..... *brevipulvilli* Tothill

15. Parafacials narrower than the eye, face slightly concave on the lower part just above the vibrissae; forceps in profile with nearly parallel edges, the tips evenly rounded, not turned up; eastern (fig. 6) ..... *smithi* n. sp.
Parafacials at least as wide as the eye; face flat; forceps in profile with a low dorsal convexity, the tips slightly knobbed and turned up; western (fig. 13) ..... *longiforceps* Tothill (*discalis* Morr.)

Females

1. Cheeks with yellow hair, at times a few darker near the lower or posterior margins 2
Cheeks black haired, with at most a few that are lighter 6

2. Mesonotal hairs wholly yellow; pleura with yellow pile; abdomen largely red with wide bands of opaque white pollen ..... *pilosa* n. sp
Mesonotal and pleural hairs black (*porca* sometimes has a few yellow pleural hairs); abdomen with considerable black, pollen not heavy and opaque 3

3. Antennae and arista yellow; parafacials with bright golden pollen ..... *senilis* Williston
Antennae and arista largely black, the second antennal segment usually red 4

4. Mesonotum subshining black, the pollen thin and the vittae not distinct; front convex and plainly sloped, parafacials narrowed below ..... *porca* Williston
Mesonotum heavily pollinose with distinct vittae 5

5. Parafacials not narrowed below, unusually wide, the front nearly flat and slightly sloped ..... *albagenae* Morrison
Parafacials narrowed below, the front convex and plainly sloped ..... *sequax* Williston

6. Black line of abdomen very narrow, not wider than the distance between the marginal bristles; pollen of face and front shining yellow, abdominal pollen thin; third antennal segment over twice the length of the second ..... *reinhardi* n. sp.
Black line of abdomen at least wider than the distance between the marginals 7

7. Pollen on the posterior abdominal segments heavy, showing marked blue reflections when the specimen is moved under the light; cheeks with fine scattered hairs, a few of which appear to be brown; mesonotum heavily pollinose; third antennal segment not over twice the length of the second ..... *longipulvilli* Tothill

Pollen of posterior abdominal segments thinner and with no blue reflections, abdomen usually mostly black 8

8. Parafacials at antennal level distinctly wider than the eye width, equibroad or narrowed below 9
Parafacials at most eye width (fig. 3) 12

9. Parafacials unusually broad at the base of the antennae but well narrowed below; eye comparatively small and set on the posterior border of the head, giving the head an overhanging, unbalanced look (fig. 4) 10
Parafacials hardly narrowed below; eye normally large; head without unbalanced look (fig. 5) 11

10. Mesonotum heavily pollinose, vittae distinct; front white pollinose when viewed from above; abdomen mostly black, with opaque white pollinose bands covering the anterior third to half of the segments, a robust western species ..... *longiforceps* Tothill
Mesonotum subshining, the brownish pollen thin, vittae distinct only in front; front subshining yellow from above; abdomen broadly reddish at the sides, pollinose bands narrower than one-third of segment length, the pollen thinner; slender eastern species ..... *smithi* n. sp.

11. Parafacials with many rows of hairs, most of which are stout and long ..... *aturgida* n. sp.
Parafacials with few rows of hairs, the hairs fine ..... *contumax* n. sp.

12. Abdomen largely red laterally on segments one, two and three *or* the front white pollinose when viewed from above 13
Abdomen at most slightly red laterally, the front subshining yellow from above 15

13. Posterior half of abdominal segments shining, highly polished; front subshining from above; abdomen largely reddish ..... *occidentalis* n. sp.
Posterior margins of abdominal segments not highly polished, the shining posterior half will be found to bear very light pollen when viewed from one angle or another; front white pollinose 14

14. Front noticeably wider at antennae than at vertex; face at lower eye level, just over vertex width; haustellum plus labellum at least nearly as long, as eye height; front longer than face, convex; pollinose bands of abdomen narrow, hairs suberect ..... *breviforceps* Tothill
Front equibroad, the face at lower eye level, equal to or less than vertex width; haustellum plus labellum about three-fifth eye height; front and face nearly equal, front flattened; abdominal bands often covering the anterior half of the segments, hairs depressed ..... *aldrichi* Tothill

15. Front and face flat; parafacials narrowed below and flat; bristles of head stout; pulvilli about three-fourths of the length of the last tarsal segment ..... *grandipulvilli* Morrison
Front and face slightly convex; parafacials hardly narrowed below; head bristles usually fine; pulvilli minute ..... *Knabia frontosa* (Say)

Gonia pilosa n. sp.

Although this species is included in the *capitata* group at present, it is quite unlikely that it will remain here when more material, particularly males, are examined. The species belongs rather to the genus *Reaumuria* RD.

Originally *Reaumuria* was erected for species similar to *Gonia* but with the third antennal segment little longer than the first two together and with the head greatly swollen. Townsend keys the genus in his group having the head at least five-sixth as long as high, broad parafacials and short antennae. *G. pilosa* agrees with this description: the antennal axis nearly as long as head height, parafacials well over eye width, third antennal segment one-sixth longer than the first and second combined, haustellum half head height. It differs further

from other members of the group in having the thorax entirely yellow haired, abdomen somewhat flattened and elongate, red with heavy opaque pollen, third vein bristled three-fourths of the way to the crossvein.

Female. Length 14 mm. Head wholly yellow with silvery-yellowish pollen; third antennal segment and arista black, the basal antennal segments and palpi yellow; cheek and frontal hairs yellow, parafacial and frontal bristles black; occipital ruff white. Thorax mostly reddish brown, darkened on the disc, and lower pleural regions ; mesonotal and pleural hairs wholly yellow, the bristles black; mesonotum with four narrow black vittae, light yellowish-brown pollinose. Wings clear, yellowish at the base; veins yellow; squamae ivory; halteres yellow. Legs black, tibiae dark reddish, yellow hair on front femora posteriorly. Abdomen mostly red, the apical two-thirds of the fourth segment and a small narrow spot on the posterior edge of segments two and three black, bands of opaque whitish pollen on the anterior half of segments two, three and four, posterior margins subshining.

Head large, antennal axis over five-sixths as long as head height; vertex five-eighths head width, front nearly flat, strongly inflated, nearly one-half longer than the face, slightly widened at the antennae base, set with three incomplete rows of bristles outside the frontal row; parafacials broad, about eye width next the vibrissae, but a third over eye width at the antennae base, set with seven or eight scattered rows of short bristles, the inner stronger; cheek four-ninths eye height; third antennal segment short, one-sixth longer than the basal two combined, second aristal joint two-thirds as long as the third; palpi robust, somewhat enlarged at the tip. Prescutum five-sevenths as long as the mesoscutum; chaetotaxy as in *Gonia;* third vein bristled three-fourths the way to the small crossvein. Abdomen robust, somewhat flattened and elongate, fourth segment wider than deep, no marginal bristles on the first segment, a stout pair on segment two, marginal row on segment three, stout submarginal and weak marginal row on segment four.

Holotype — ♀, Treesbank, Man., 20.VII.1910 (J. B. Wallis) ; No. 5453 in the Canadian National Collection, Ottawa.

Gonia reinhardi n. sp.

(fig. 11.)

This species is similar to *sequax* Will., but with black haired parafacials and small, slender, turned-up forceps.

Male. Length 10-11 mm. Head wholly yellow, third antennal segment and arista black; vertex just over half head width, front slightly convex, equibroad, face slightly widened; parafacials slightly convex, narrowed below, set with three scattered rows of short setae besides the strong inner row; cheek black haired; third antennal segment four times the second; occipital ruff pale yellow.

Thorax dark, scutellum, prescutellar area and lateral line reddish, mesonotum light grey-brown pollinose, the four broad darker vittae hardly distinguishable. Wing clear, veins yellow; squamae white, yellow bordered; halteres dark. Legs black; claws and pulvilli shorter than the last tarsal segment.

Abdomen robust, largely red, the fourth segment and a narrow central vitta black; segments two, three and, more broadly, segment four with silvery pollinose anterior margins; abdominal hairs stout and depressed; venter yellowish-red, fifth sternite black. Genitalia small, forceps slender, strongly humped basally when viewed in profile with slender upturned tips.

Female. Except for sexual and secondary sexual characters, the female is very similar to the male. The species may be confused with *longipulvilli* Tll., which it resembles in having black cheek hairs, but it differs in the shining or subshining posterior abdominal segments with only narrow pollinose bands and the longer third antennal segment (2½ times the second).

Holotype — ♂, Pingree Park, Colo., VIII.17.32 in Dr. Reinhard's Collection.
Allotype — ♀, Yakima, Wash., 7.26.22 (A. L. Lovett).
Paratype — ♂, Centennial Wy., Aug. 15, 1938.

Gonia contumax n. sp.
(fig. 7.)

Related to *breviforceps* Tll. from which it may be readily separated by the robust form and very broad parafacials.

Male. Length 12 mm. Head wholly yellow; front, face and cheek white pollinose, palpi yellow; vertex three-fifths head width, front slightly widened at the antennae, nearly flat, three rows of bristles outside the frontal row; parafacials very broad, not narrowed below, fully as broad as the eye, set with five scattered rows of slender setae; antennae mostly black, the second segment somewhat brownish, third segment three times the length of the second; cheek one-third eye height.

Thorax dark, scutellum, prescutellar area and lateral line reddish; mesonotum thinly dark brownish pollinose, four broad darker vittae in front of suture, three behind; hairs long, fine and erect. Wings clear, veins brown; squamae white. Legs black, claws and pulvilli short.

Abdomen mostly black, reddish at the sides of segments two and three, greyish yellow pollinose on the anterior margins of segments two and three and on most of segment four; abdominal hairs long and erect particularly on the apical segments and in the central region, depressed laterally; venter and sternites black. Genitalia black, forceps short and broad, nearly straight on the dorsal and ventral edges and with evenly rounded tips.

Female. Except for sexual characters the female is similar to the male.

Holotype— ♂, Westport, Wash., IV.8.33 (S. E. Crumb); in Dr. Reinhard's Collection.
Allotype— ♀, Westport, Wash., IV.9.33 (J. Wilcox).
Paratype— ♂, Westport, Wash., IV.9.33 (J. Wilcox).

Gonia aturgida n. sp.

This species was included by Morrison in *Gonia turgida* Cq., but is distinct from that species on the less prominent front, elongate proboscis and abdominal pattern.

Male. Length 12-13 mm. Head three-fourths as long as high, front prominent, convex and bulging, wholly yellow with whitish pollen; haustellum slender, about half head height in length; parafacials broad, one-fourth less than eye width above, narrowed below, set with a stronger inner row of bristles and eight to ten dense finer rows; vertex not half head width, front and face noticeably and evenly widened; cheek four-ninths head height, black haired; eye comparatively small; antennae and arista black, the second antennal segment brownish; palpi yellow; occipital ruff pale yellow.

Thorax mostly black with brown or grey pollen, scutellum, prescutellar area, lateral line and humeri reddish; hair fine and erect; vittae narrow. Wings clear, veins yellow, squamae white. Legs black, claws and pulvilli short.

Abdomen mostly black, broadly reddish at the sides; grey pollinose on the anterior third of segments two, three and the anterior half of segment four; venter black centrally; hairs long and erect. Forceps short, broadly triangular from the dorsal view, ventral edge straight, tips evenly rounded.

Female. One female taken at the same place and time as the male compares very closely with the female of *contumax* n. sp., but is much less robust and the parafacials are set with longer hairs most of which are but slightly less slender than the inner row. Unlike the male, the parafacials are not noticeably narrowed below and are set with only three of four scattered rows of hairs.

Holotype— ♂, Idaho, April 28, 1919 (E. H. Quayle); No. 5456 in the Canadian National Collection, Ottawa.

Allotype— ♀, same data as type.

Paratypes— 1 ♂, Mortlack, Sask., 31.V.09; 1 ♂, 3-mile Creek, Sask., 23.VI.1921 (A. E. Cameron); 1 ♂, Kiona, Wn., 23.IV.1933 (J. Wilcox). The last named paratype is in Dr. Reinhard's Collection.

Gonia occidentalis n. sp.

(fig. 12.)

A Western species allied to *aldrichi* Tll., but with reddish tibiae in the male.

Male. Length 12-13 mm. Head wholly yellow, with light yellowish pollen, subshining on the front; vertex half head width, front convex and well sloped, bearing two rows of bristles outside the frontal row; parafacials narrower than the eye, slightly narrowed below, bulging (much as in the *capitata* group), set with a stronger inner row of bristles and four or five dense weaker rows; haustellum long; cheeks one-third eye height, black haired; third antennal segment black, four or five times as long as the second; occipital ruff pale.

Thorax mostly dark; scutellum, prescutellar area, lateral line and humeri reddish; mesonotum light grey-brown pollinose with four narrow vittae; hair fine and erect. Wings clear, veins yellow, third vein bristled about one-third of the way to the crossvein; squamae white, yellow tinged along the border. Legs mostly black, all the tibiae reddish-yellow; claws and pulvilli short.

Abdomen largely red; last segment, posterior margin of third and a broad central line black, greyish pollinose on the anterior half of the segments and along the central line; hairs stout and erect. Forceps long and narrow, from dorsal view rapidly narrowing from the base, parallel sided on the apical half, tips slightly turned up.

Female. The females which belong here differ from the males in having black legs and lacking the characteristic head and closely bristled parafacials. In general they are similar to *aldrichi* Tll., largely reddish at the sides of segments one, two and three; the pollen however is thinner, the posterior halves of the segments are polished and the front is thinner pollinose.

Holoype— ♂, Hedley, B. C., 15.V.1920 (W. B. Anderson); No. 5454 in the Canadian National Collection, Ottawa.

Allotype— ♀, Penticton, B. C., 4.V.1927 (E. R. Buckell).

Paratypes—1 ♂, Hedley, B. C., 15.V.1920 (W. B. Anderson); 1 ♀, Penticton, B. C., 4.V.1927 (E. R. Buckell); 1 ♀, Osoyoos, B. C., 24.IV.1927 (E. R. Buckell), all in the Canadian National Collection; 1 ♂, Rainier Natl. For., Wn., 2.VI.1935 (J. Wilcox); 1 ♂, Bozeman, Mont., May 9: 6 ♀, Boulder, Colo., 25.V.1932, 1.VI.1932, and 2.VI.1932 (M. T. James) in Dr. Reinhard's Collection.

Gonia robusta n. sp.

(fig 10)

Related to *aldrichi* Tll. but readily recognized by the robust, densely haired abdomen and very broad forceps.

Male. Length 13 mm. Head light, front and face white pollinose; vertex not half head width, the front slightly widened at the antennae; parafrontals set with one or two rows of bristles outside the frontal row; parafacials not as wide as the eye, only slightly narrowed below, set with scattered long hairs in two or three rows; epistoma slightly projecting; cheek just over one-third eye height, wholly black haired; third antennal segment black, four times as long as the second, palpi yellow; occipital ruff white.

Thorax dark; scutellum, prescutellar spot, broad lateral line and humeri red; mesonotum brownish pollinose with four broad vittae; hairs fine and dense. Wings clear, yellowish at the base, veins brown; squamae white. Legs black; claws and pulvilli short.

Abdomen mostly black, reddish at the sides, very robust and short, as broad as long; segments silvery pollinose on the anterior third, hind margins shining; hairs moderately dense, fine and erect particularly on the central region. Forceps as wide across the base as long, evenly sloped from base to apex, dorsal convexity low, tips strongly turned up.

Holotype—♂, Wabamum, Alta., May 11, 1924 (E. H. Strickland); No. 5457 in the Canadian National Collection, Ottawa.

Paratypes—5 ♂, same data as type, 1 ♂, Edmonton, Alta., 16.V.1924 (E. H. Strickland).

Gonia smithi n. sp.
(fig. 6)

This species is the Eastern counterpart of *longiforceps* Tll. and can be separated by the narrower parafacials, slightly concave face, more protuberant epistoma and shorter straighter forceps.

Male. Length 10-11 mm. Head yellow with dense white pollen on the face and front; vertex just over half head width, front slightly widened at the antennae; parafrontals bearing two rows of bristles outside the frontal row; parafacials as wide as the eye above but slightly narrowed below, set with four or five scattered rows of setae besides the strong inner row; face slightly concave above the vibrissae; cheek three-sevenths eye height, black haired; third antennal segment black, four times as long as the second; palpi yellow; occipital ruff yellowish.

Thorax dark, scutellum and lateral line reddish; mesonotum thin brownish pollinose, the four darker vittae obscure. Wing clear, veins brown; squamae white. Legs black; claws and pulvilli short.

Abdomen largely black, reddish at the sides, segments grey pollinose on the anterior fourth, the posterior margins shining; hair moderately dense, fine and erect particularly in the central region and on the last segment. Forceps long and narrow, rapidly tapering at the base, nearly parallel-sided on the apical two-thirds, dorsal convexity low, ventral edge straight, tips evenly rounded, not turned up.

Female. As in the male the female is smaller and has more red on the abdomen than *longiforceps*. The head shows the same protuberant, overhanging, unbalanced look as *longiforceps* although not as noticeably as in the western species. It differs further from *longiforceps* in having the front subshining, mesonotum lighter pollinose, pollinose abdominal bands narrow and shining.

Holotype—♂, Toronto, Ont., 13.VI.05 (paratype of *discalis* Morr.); No. 5455 in the Canadian National Collection, Ottawa.

Allotype—♀, 14.4.98, no locality or collector.

Paratypes—1 ♂, Toronto, Ont., April 1906; 2 ♂, Chatham, Ont., 29.IV.1928 (C. W. Smith); 1 ♂, Aweme, Man., 21.IV.08 (Wallis); 1 ♀, Dalvay House, Can. Nat. Park, P. E. I., 19.VII.40 (J. McDunnough).

Gonia longiforceps Tothill
(fig. 13)

Gonia longiforceps Tll., Can. Ent., 56, 208, 1924, Lethbridge, Alta.
Gonia discalis Morr., Can. Journ. Research, Vol. 18, Sec. D, p. 347, 1940, Nicola, B. C., NEW SYNONYMY.

The erect dorsal vestiture of the abdomen used by Morrison to separate *discalis* from *longiforceps* is highly variable, but generally present along the dorsal line and on the fourth segment; laterally the hairs are mostly depressed, a few specimens however have depressed hair on the entire surface. The forceps are considerably narrower than *brevipulvilli*, abdomen mostly black, front broader and more flattened, parafacials decidedly wider at the antennae base than below.

The species is common in the Prairie Provinces and in British Columbia,

Gonia brevipulvilli Tothill

(fig. 9)

Gonia brevipulvilli Tll., Can. Ent., 56, 211, 1924, Fredericton, N. B.

Morrison's synonymy of *brevipulvilli* with *longiforceps* is in error; *brevipulvilli* is a larger species with abdominal hairs stout and depressed, forceps broader, not so strongly sloped at the base, parafacials nearly equibroad, the abdomen largely red or wholly black.

The species occurs across Canada, but only two of the specimens in the Canadian Collection are from the Prairie Provinces (Aweme, Man. and Saskatoon, Sask.).

Gonia aldrichi Tothill

(fig. 8)

Gonia aldrichi Tll., Can. Ent., 56, 209, 1924; Morrison, Can. Journ. Research, Vol. 18, Sec. D, 345, 1940, Coaldale, Alta.

This species is generally easily recognized by the broad triangular forceps; some specimens however have the forceps abnormally humped along the centre or the edges compressed so that the forceps look very like those of *brevipulvilli*. The additional characters in the key will help to separate the specimens that show this condition.

Morrison has given the distribution as across Canada, but the specimens in the Canadian National Collection are from Manitoba, Saskatchewan and Alberta. Tothill's records are of a mixture of species.

Gonia carinata Tothill

Gonia carinata Tll., Can. Ent., 56, 208, 1924.

I have had no opportunity to check the holotype and so could not place the species. The description is very close to the species described above as *G. reinhardi* n. sp. The median carina may be due to abnormal humping along the central line, however, and until the holotype can be seen the species must remain unrecognized.

BOOK NOTICE

GENERAL ENTOMOLOGY, by S. W. Frost. Published by McGraw-Hill Book Company, Inc. Price $4.00.

Professor Frost has produced a book which will prove of real value as a text book or reference work. He is to be congratulated on bringing together a wealth of information not found in other text books. For example, one section of nearly seven pages is devoted to the fecula of insects.

The book is well named *General Entomology*. Emphasis is placed on the habits of insects and also on the immature stages. The inclusion of keys to larvae is a feature of especial value. The only criticism to be offered is that the value of the book to students beginning work in entomology is slightly impaired by the occasional use of scientific names without common names or without an indication of the group to which these insects belong. Some errors or discrepancies appear in the text or in titles of illustrations but these are not serious.

It is the opinion of the reviewer that Frost's *General Entomology* will find a ready reception amongst teachers of entomology and will occupy a place not filled by any other text book. Any worker in entomology will find a study of the book well worth while.

A. W. Baker.

NOTE ON THE ESTABLISHMENT IN CANADA OF IMPORTED PARASITES OF THE PEA MOTH, *LASPEYRESIA NIGRICANA* STEPH.*

BY GEO. WISHART,
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The pea moth, *Laspeyresia nigricana* Steph., is a pest of considerable importance in the following areas: the Lower Fraser Valley, B. C., the Gaspe Peninsula, Que., Southern New Brunswick, and the Annapolis Valley, Nova Scotia. With a view to assisting in its control, the liberation of parasites was commenced in 1936, and all of the areas have received attention except New Brunswick. The work may be roughly divided into three phases: the liberation of parasites of *Laspeyresia molesta* Busck against *L. nigricana;* the importation, rearing and liberation of parasites obtained from *L. nigricana* in England; and recovery studies to determine the status of the introduced species. The data for all of these operations are summarized in tabular form at the end of this paper.

The parasites *Ascogaster carpocapsae* Vier. and *Macrocentrus ancylivorus* Roh. had shown their effectiveness against the Oriental fruit moth *L. molesta.* Neither was known to occur in the areas in British Columbia or Quebec where the pea moth was present. It was thought possible that either or both of them might attack the pea moth. To check this possibility test liberations were made in 1936 and 1937.

At the request of this laboratory, the Imperial Parasite Service made a study of the pea moth and its parasites in England. Cameron (1) reported that *Ascogaster quadridentatus* Wesm. attacked as high as 48 per cent of the pea moth larvae and *Glypta haesitator* Grav. as high as 24 per cent. Collection of parasite material was started in 1936 and continued until the outbreak of war in 1939. Parasitized host larvae were shipped to Belleville where they were reared out at the proper time for liberation. The methods used in handling this material were described by the writer in an earlier paper (2). In making the liberations, the largest numbers of parasites were sent to British Columbia, since it was in this area that the greatest damage was reported, and it appeared that it presented the greatest probability of the parasites becoming established.

For recovery studies, pea moth cocoons were collected in British Columbia by Mr. R. Glendenning, in Quebec through Dr. A. D. Baker, and in Nova Scotia by Mr. A. D. Pickett and Dr. J. M. Cameron. Rearing of recovery collections was carried on in the same manner as the rearing of imported cocoons.

No *Macrocentrus ancylivorus* adults were reared from collected material, and no *Ascogaster* were taken until the European *Ascogaster quadridentatus* had been liberated. A considerable difference of opinion has occurred as to whether or not *A. quadridentatus* and *A. carpocapsae* are one and the same species. Some authorities consider them as identical, but Mr. H. R. Boyce of our staff, after careful study, appears to have genetical as well as other evidence to indicate that they are at least distinct races or strains. Mr. Boyce has examined the recovered *Ascogaster* and states that all recovered specimens appear to be of the imported strain. This opinion, coupled with the fact that no *Ascogaster* were recovered until imported adults were liberated, makes it appear relatively certain that these now established are the progeny of imported individuals. The recoveries of *Glypta haesitator* also are very gratifying. It seems reasonable to assume that these two species are established at Sumas Prairie, British Columbia, and an effort is being made to propagate them at the Belleville laboratory for further distribution.

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Parasites of the Pea Moth, *Laspeyresia nigricana* Steph.

Year	Location	Native Parasites Released: Asco-gaster carpo-capsae(1)	Native Parasites Released: Macro-centrus ancyli-vorus	Native Parasites Released: Phanero-toma sp. (3)	Imported Parasites Released: Asco-gaster quadrid-entatus	Imported Parasites Released: Glypta haesi-tator	Imported Parasites Released: Angitia sp.	No. of hosts ex-amined	Parasites Reared
1936	St. Godfroi, P.Q.	880	294					394	None
1936	Chilliwack, B.C.	300	905					5000	None
1936	Sumas Prairie, B.C.	966	524					5000	None
1937	Sumas Prairie, B.C.	50			34		14	200	None
1937	St. Godfroi, P.Q.				51	12			
1938	Pictou, N.S.				900	10	11		
	Chilliwack, B.C.				127	735	5	200	None
	Musselwhite, B.C.				755				
	St. Godfroi, P.Q.					379			
1939	East Chilliwack, B.C.				2367	25	44		
	Sumas Prairie, B.C.				2010	662		2500	4 G.haesitator 1 A.quadridentatus
	Nicomen Island, B.C.					124			
	Middletown, N.S.				592	279			
	Sumas Prairie, B.C.							8000	92 Phanerotoma sp. 1 mile from Lib. point.
	Pictou, N.S.							100	None
	Middletown, N.S.							100	None
	New Carlisle, P.Q.							600	None
1940	Middletown, N.S.			42	309	94		435	None
	Sumas Prairie, B.C.							3650	1 G.haesitator 5 Phanerotoma sp.
1941	Sumas Prairie, B.C.							3350	7 A.quadridentatus 3 G.haesitator 25 Phanerotoma sp.
1942	Middletown, N.S.			25	305				

(1) Ascogaster carpocapsae Vier. - a parasite of Carpocapsae pomonella L. and Laspeyresia molesta Busck.

(2) Macrocentrus ancylivorus Roh. - a parasite of Laspeyresia molesta Busck., Ancylis comptana Froehl. etc.

(3) Reared from L. nigricana Steph. in British Columbia.

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Canadian Industries Ltd., Fertilizer Division, P.O. Box 10, Montreal, P.Q. — *Perenox*
Niagara Brand Spray Co. Ltd., Burlington, Ont.
The N. M. Bartlett Spray Works, Beamsville, Ont.

DINITRO COMPOUNDS

Niagara Brand Spray Co. Ltd., Burlington, Ont.
The N. M. Bartlett Spray Works. Beamsville, Ont.

DERRIS (See Rotenone)

Canadian Industries Ltd., Fertilizer Division, P.O. Box 10, Montreal, P. Q.
Niagara Brand Spray Co. Ltd., Burlington, Ont.
The N. M. Bartlett Spray Works, Beamsville, Ont.

FLUORINE COMPOUNDS

Canadian Industries Ltd., Fertilizer Division, P. O. Box 10, Montreal, P. Q. — *Alorco Cryolite*
Irwin Dyestuff Corporation Ltd., 800 Read Bldg., Montreal, P. Q. — *Imulan W Extra* (Mothproofing Agent)
Niagara Brand Spray Co. Ltd., Burlington, Ont.

FUMIGANTS (Buildings, Grain, Soil, etc.)

Dunn Sales Ltd., 229 Yonge St., Toronto, Ont. — *Nico-Fume (Pressure Fumigators)*
Fairfield Chemical Co. Ltd., 27 Front St. East, Toronto, Ont. — *Liquid HCN, Zyklon Discoids, Cyanogas, Weevilcide, Chloropicrin*
Innes, Speiden & Co., 117 Liberty Street, New York. — *Larvacide*
Canadian distributors: Strong-Scott Manufacturing Co., Ltd., 50 Front Street East, Toronto; 772 Dufferin Avenue, Winnipeg, Man. and Calgary, Alta.

GARDEN AND GREENHOUSE SPRAYS

Dunn Sales Ltd., 229 Yonge St., Toronto, Ont. — *Nico-Fume (Liquid and Powder), Black Leaf 40*
Niagara Brand Spray Co. Ltd., Burlington, Ont.
Stanco (Canada) Ltd., 187 Dufferin St., Toronto, Ont. — *Garden Flit (Powder)*

HOUSEHOLD INSECTICIDES

Canada Rex Spray Co. Ltd., Brightón, Ont. *Fly-tox, Tat Flea Powder*
Irwin Dyestuff Corporation Ltd., 800 Read Bldg., Montreal, P.Q. *Imulan W Extra*
Mysto, Inc., 3128 Masson St., Montreal, P. Q.
Shell Oil Co. of British Columbia, Ltd., Vancouver, B. C. *Shelltox Household Insect Spray*
Shell Oil Co. of Canada Ltd., Toronto, Ont. *Shelltox Household Insect Spray*
Stanco (Canada) Ltd., 187 Dufferin St., Toronto, Ont. *Flit Liquid, Flit Powder, Flit Repellent Lotion*

HORMONE PRODUCTS

Canadian Industries Ltd., Fertilizer Division, P.O. Box 10, Montreal, P.Q. *Parmone*
Niagara Brand Spray Co. Ltd., Burlington, Ont.
The N. M. Bartlett Spray Works, Beamsville, Ont.

LIME

Niagara Brand Spray Co. Ltd., Burlington, Ont.
The N. M. Bartlett Spray Works, Beamsville, Ont.

LIME SULPHUR

Niagara Brand Spray Co. Ltd., Burlington, Ont.
The N. M. Bartlett Spray Works, Beamsville, Ont.

LIVESTOCK DIPS, DISINFECTANTS AND SPRAYS

Canada Rex Spray Co. Ltd., Brighton, Ont. *Stockaid*
Dunn sales Ltd., 229 Yonge St., Toronto, Ont. *Black Leaf Poultry Worm Powders and Pellets*
Niagara Brand Spray Co. Ltd., Burlington, Ont.
Shell Oil Co. of British Columbia, Ltd., Vancouver, B.C. *Shell Livestock Spray*
Shell Oil Co. of Canada, Ltd., Toronto, Ont. *Shell Livestock Spray*

NICOTINE PRODUCTS

Canadian Industries Ltd., Fertilizer Division, P.O. Box 10, Montreal, P. Q.
Dunn Sales Ltd., 229 Yonge St., Toronto, Ont. *Black Leaf* 40, *Black Leaf* 155, *Nico-Fume, Vapo-Fume*
Niagara Brand Spray Co. Ltd., Burlington, Ont.
The N. M. Bartlett Spray Works, Beamsville, Ont.

OIL SPRAYS

Canadian Oil Companies, Ltd., Hamilton and St. Catharines, Ont. *En-Ar-Co Spray Oil*
Niagara Brand Spray Co. Ltd., Burlington, Ont.
Shell Oil Co. of British Columbia, Ltd., Vancouver, B. C. *Shell Helix Dormant Spray Oils* 18 *and* 22, *Shell Helix Spray Oil* 15, *Shell Nicona Garden Emulsion*
The N. M. Bartlett Spray Works, Beamsville, Ont.

PEST CONTROL OPERATORS

Mysto, Inc., 3128 Masson St., Montreal, P. Q.

PYRETHRUM PRODUCTS

Niagara Brand Spray Co. Ltd., Burlington, Ont.
Shell Oil Co. of British Columbia, Ltd., Vancouver, B. C. *Shelltox Household Insect Spray, Shell Livestock Spray*
Shell Oil Co. of Canada Ltd., Toronto, Ont. *Shelltox Household Insect Spray, Shell Livestock Spray*
The N. M. Bartlett Spray Works, Beamsville, Ont.

ROTENONE PRODUCTS (Derris, Cubé, Timbo, etc.)

Canadian Industries Ltd., Fertilizer Division, P.O. Box 10, Montreal, P.Q.
Niagara Brand Spray Co. Ltd., Burlington, Ont.
The N. M. Bartlett Spray Works. Beamsville, Ont.

SULPHUR SPRAYS AND DUSTS

Canadian Industries Ltd., Fertilizer Division, P.O. Box 10, Montreal, P.Q. *Sulforon*
Niagara Brand Spray Co. Ltd., Burlington, Ont.
The N. M. Bartlett Spray Works, Beamsville, Ont.

SPRAYING AND DUSTING EQUIPMENT

Niagara Brand Spray Co. Ltd., Burlington, Ont.

STORED PRODUCT INSECTICIDES

Canada Rex Spray Co. Ltd., Brighton, Ont. *Rex* 99

WEED KILLERS (Moss Killers)

The N. M. Bartlett Spray Works, Beamsville, Ont.

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